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ABSTRACT

We study the economic role of banks' soft information, which evolved from repeated lending relationships, in the context of loan default. Using a proprietary database from one of the largest state-owned commercial banks in China, we find that the bank's internal credit rating scores play a significant role in default prediction. While the internal credit rating incorporates firm-specific hard information such as financial ratios, it is the soft information component of these ratings that contributes to the improvement in assessing credit quality. More importantly, the relative importance of soft information over hard information depends on the depth of the lending relationship. When evaluating loan delinquency, a strong lending relationship allows soft information to substitute for, rather than complement to, the role of hard information, especially the hard information that is subject to easy manipulation by Chinese firms.

Key words: Debt default, internal credit ratings, credit risk, relationship lending, soft information

JEL Classification: G21, D81, D82, D83, F34

INFORMATION FROM RELATIONSHIP LENDING: EVIDENCE FROM CHINA

1. INTRODUCTION

The theoretical literature on financial intermediation has long recognized the superior ability of banks in acquiring information or knowledge beyond that which is available to ordinary financial market participants (e.g., Ramakrishnan and Thakor 1984, Boyd and Prescott 1986, Diamond 1991, and Dow and Gorton 1997). Many researchers emphasize the "soft" nature of this special knowledge in the notion that soft information is not easily and accurately conveyed, verifiable, or transferable. In contrast to the "hard" information derived from firms' financial statements or industrial data, most researchers attribute soft information to banks' relationships with borrowing firms (e.g., Peterson 2004). In light of the central role of the banking system in channeling capital to the real economy, however, few studies have directly examined the nature and significance of this special knowledge in predicting defaults on commercial loans.

In this paper we investigate to what extent this special knowledge can predict loan defaults, and whether it acts as a complement or a substitute for any particular type of hard information in accessing credit delinquency. Using a proprietary dataset from a major Chinese state-owned bank containing information on all loans offered to Chinese firms during the period of 2003-2006, we first document a substantial decline in loan defaults after the implementation of an internal credit rating system in 2004. Internal credit ratings are significantly related to the commonly used firm-specific financial ratios in predictable ways, and changes in these financial ratios lead to changes in credit ratings. These findings suggest that, at least with regard to credit ratings, loan decisions by Chinese banks are based on commercial principles instead of government policies, which may have contributed to the overall performance improvement of the Chinese banks in recent years.[1]

[1] Since 2002, major state-owned commercial banks in China have embarked on a series of reforms, which have generally gone through the following four stages: financial reorganization, injection of new capital by the state, introduction of foreign strategic investors, and eventual IPOs. Amid the banks' financial reorganization efforts is the introduction of an internal credit rating system. Concurrently, the average non-performing loan (NPL) ratio of the

Furthermore, our analysis reveals that the bank's internal credit ratings largely subsume firm-specific hard information, as the majority of the commonly used financial ratios are no longer significant in predicting loan defaults after including these ratings. Therefore, we next investigate to what extent the improvement in loan quality is due to the bank's soft information arising from extensive borrowing/lending relationships, instead of relying on firm-specific hard information.

To extract the firm-specific soft information component from the bank's private credit rating score, we follow Agarwal and Hauswald (2008) and orthogonalize the credit rating with the firm's financial factors. To capture the nature of soft information generated from a repeated lending relationship, we construct three proxies to identify the depth of banking relationship. Our first proxy is based on a firm's ownership, in which we classify a firm as either state-owned or non-state-owned. Since a state bank's lending relationship with state-owned firms is historically mandated by the Chinese government, this proxy is relatively exogenous and thus mitigates the endogeneity of matching between a firm and its bank that typically affects such studies (Berger, Miller, Petersen, Rajan, and Stein 2005). The other two proxies are based on the frequency of corporate borrowing, and the length of the banking relationship.

We find that the bank's internal credit ratings contain useful information beyond that which is conveyed by the commonly used financial and industrial variables. This soft information, captured by the residual component of the internal credit rating that is unpredictable by these variables, is statistically and economically significant in forecasting loan defaults. Our result thus provides evidence in support of the theoretical arguments that banks possess special knowledge in assessing credit quality.

More importantly, for state-owned firms, firms that borrow more frequently from the bank, and firms that have a longer period of banking relationship, the majority of proxies for hard information are no longer significant in predicting loan default once the soft information component of internal credit rating is included. By contrast, for firms that are not state-owned, borrow less frequently from the bank, or have a shorter period of banking relationship, most proxies for hard information remain significant

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major commercial banks in China decreased from 18% in 2002 to 5% in 2007. In a companion paper, we investigate other potential factors responsible for the decline of NPL ratio in Chinese banks.

even in the presence of the bank's soft information. Our findings indicate that the extent to which soft information dominates hard information depends on the depth of the lending relationship, and that an extensive lending relationship allows soft information to substitute for, rather than complement to, the role of hard information in evaluating loan delinquency.

Interestingly, for state-owned firms and firms that maintain a long-term or frequent banking relationship, it is the hard information that can be easily manipulated by Chinese firms – such as ROA – that is displaced by the bank's soft information. In contrast, the hard information that is not subject to easy manipulation remains significant in predicting loan defaults even after the inclusion of the bank's soft information. Our analysis on earnings management further confirms this finding. The economic impact of soft information is significantly more pronounced among firms with higher level of earnings management, especially among state-owned firms and those that maintain a frequent or long-term relationship with the bank.

Our paper contributes to the finance literature analyzing the role of hard and soft information in bank lending. Most of the literature focuses on small business financing and on loan underwriting and pricing (e.g., Petersen and Rajan 1994, Berger and Udell 1995, Scott 2004, Uchida, Udell and Yamori 2007, and Cerqueiro, Degryse and Ongena 2008). Instead, we study the role of soft information in the context of loan default. Our research design and unique dataset allow us to disentangle the soft information that is ascertained through repeated lending relationships from the one being driven either by bank competition and relative size or by geographical proximity. In addition, we directly assess the importance of banks' soft information for large firms and industrial loans, which is usually absent from the literature.

Our paper is related to Grunert, Norden, and Weber (2005) who find that the combined use of financial and non-financial factors of credit rating scores predicts more accurately loan defaults by German firms than the use of either financial or non-financial factors alone, and to Agrawal and Hauswald (2008) who document that the soft information component of a credit rating predicts loan defaults of small firms. Differing from the former, we show that soft information evolved through

extensive lending relationships not only improves default prediction, but also prevails over the effect of financial factors. Differing from the latter, we establish that soft information plays an important role for large firms and commercial loans, despite the fact that there tends to be more hard information about large firms. In addition, we show that the effect of soft information is more profound in the presence of a stronger lending relationship.

Our paper is also related to the literature analyzing how financial and industrial factors predict corporate bankruptcy (e.g., Altman 1968). Instead, we focus on loan default. Our findings complement this literature by indicating that hard information, derived from firm's financial statements, predicts not only a firm's bankruptcy but also short-term loan delinquency.

The rest of the paper is organized as follows. Section 2 discusses institutional details about China's banking system and recent banking reforms, and the uniqueness of our research setting. Section 3 describes our sources of data. Section 4 reports the results on the determinants of loan default and internal credit rating. Section 5 examines the role of soft information. Section 6 discusses various tests for robustness. Section 7 concludes.

2. CHINA'S BANKING SYSTEM AND RESEARCH SETTING

2.1 The role of the big four

In an attempt to model after the Soviet in which a centralized banking system is used to support a central planning economy, China established the People's Bank of China (PBOC) in December of 1948. Prior to 1978, the PBOC served as both a central bank and a commercial bank.

In 1978, China embarked on a market-oriented economic reform. Accordingly, four state-owned banks – the Agricultural Bank of China, the Bank of China, China Construction Bank, and the Industrial and Commercial Bank of China – were established during the period of 1979-1984. The so-called "big four" serve financing needs from four respective sectors: agriculture, foreign trade, infrastructure construction, and manufacturing industries. After 1984, however, each of the "big four" was allowed to

broaden the scope of their operations into other banks' sectors amid China's effort to introduce competitions among banks.

Throughout the time the firm-bank relationship is mandated by the government instead of driven by commercial principles. Most of the state-owned banks' loans were originated to state-owned enterprises (SOEs) based on political and policy considerations. With the concerns for social instability accompanied with rising unemployment, loans are continuously granted by the banks to pay workers' compensations despite that SOEs remain unprofitable and non-competitive. Consequently, non-performing loans (NPLs) piled up on banks' financial statements.

From 1986 to 1996, approximately 11 more banks, including the Bank of Communication, China Merchants' Bank, Pudong Development Bank, and Shenzhen Development Bank, were established in order to increase the competitiveness of the China's banking industry. These banks are usually jointly owned by several legal entities such as local governments and enterprises. Although the legal entities are usually state-owned, these "joint-stock" banks are smaller, albeit more efficiently run, than the big four state-owned banks.

In 1995, the State Council of China announced that credit unions – previously existed in many Chinese cities – can no longer be transformed into city cooperative banks through equity contributions from local governments, enterprises, and local citizens. During the same year, China passed the "Central Bank Law" and "Commercial Bank Law", explicitly specifying the functions, rights and duties between the central bank (PBOC) and commercial banks. In 2003, China established the Banking Regulatory Commission to take over part of the regulatory duties previously held by the PBOC. In turn, the PBOC focuses on its macroeconomic and monetary responsibilities.

China permits foreign banks to conduct business in the mainland China starting 1979. Initially, most of the foreign banks' business is restricted to foreign currency exchange. As a precondition to join the WTO, China pledged the commitment to open its domestic currency (RMB) business to all foreign banks by 2006.

2.2 The reform of China's commercial banks

Mounting non-performing loans have long plagued the financial statements of China's commercial banks, especially the "big four". In 1997, 30% of all the loans outstanding were NPLs. By 2003, this ratio was still as high as 20%. The high percentage of NPLs was usually attributed to (1) the government's direct or indirect ownership and control of commercial banks to pursue its political and policy agendas, (2) inefficient operation and soft budget constraint associated with some SOE borrowers, and (3) ineffectiveness in enforcing the bankruptcy law.

The Chinese government has since initiated a series of reforms to curb the increasing risk associated with the high level of NPLs. In 1998, 270 billion RMB was injected by the Finance Ministry to replenish the deteriorating capital of the big four state-owned banks, followed by a transfer of 1.4 trillion RMB NPLs (at their face value) from these banks to the corresponding four newly created Assets Management Companies in 1999.

As the next step of the reform, the government "corporatizes" the state-owned banks by introducing foreign strategic investors and then listing these banks on the Hong Kong Stock Exchange and/or the Shanghai Stock Exchange. In late 2003, the government injected $22.5 billion each into the Bank of China and China Construction Bank as equity capital, and corporatized the two as joint-stock commercial banks. In 2004, Royal Bank of Scotland, UBS, Bank of America, and TEMASEK took minority equity positions in these two banks as strategic investors. China Construction Bank went public in 2005. The state retained a controlling stake (67.49%) of the bank after its listing on the Hong Kong Stock Exchange. After the Bank of China's IPO in both Hong Kong and Shanghai in 2006, the state's equity stake was 59.12%.

In 2005, $15 billion were used to capitalize the Industrial and Commercial Bank of China (ICBC), which was then reorganized and corporatized. Goldman Sachs, Allianz, and American Express bought a total of 8.44% of its equity. ICBC became publicly traded on the Hong Kong and Shanghai stock exchanges in 2006. After its IPO, the state controls 72.47% of the shares.

Many believe that the banking reforms since 2003, including bank restructuring, introduction of strategic investors, and public listings, have fundamentally changed the corporate governance and risk management practices of Chinese state-owned banks. A direct consequence is the lower NPL ratios. Nevertheless, doubts remained about the effectiveness of these banking reforms and subsequently, the competence of China's state-owned banking system.

2.3 Chinese banks as a research setting

We obtain a large dataset from one of the big-four state-owned commercial banks in China. With 2.5 million corporate customers and 150 million individual customers, our bank maintains a dominating lending position in China. As of 2006, it had assets of RMB 7,055 billion (US$893 billion), with over 18,000 outlets including 106 overseas branches and agents globally.

The research setting offers several unique features. Banks play a dominating role in China's financial system. In 2004 alone, bank loans account for 83% of external capital raised by non-financial firms, in comparison with 5% of external capital raised from equity market and 12% from public debt market. Unlike many other developed countries where bank lending is predominant among small businesses, Chinese firms rely mainly on bank financing regardless of the scopes of their businesses and scales of their operations.

Within China's banking system, the big four state-owned banks dominate the loan market. By the end of 2004, the "big four" account for 55% market share in terms of asset scale. With each of the big four banks specializing in a specific area of lending, the impact of competition from other banks is either non-existent or at most marginal. This mitigates the issues of bank size and competition that commonly affect such studies.

The unique setting of China's banking system also allows us to concentrate on the nature and role of firm-specific soft information obtained by the bank from its long-term and repeated lending relationships. As discussed later in Section 5, one of our proxies for the depth of banking relationship is

based on whether or not a firm is state-owned.[2] Since state banks' relationship with state-owned firms is historically mandated by the Chinese government, this proxy is relatively exogenous and consequently, mitigates the endogeneity of matching between a firm and its bank that typically affects such studies (Berger, Miller, Petersen, Rajan, and Stein 2005). In addition, the state-ownership historically mandates the mapping of a nationwide distribution of bank branches. Since the backbone of our bank's branch network was originally set up exogenously, instead of evolving endogenously based on the regional economic development as in previous studies for developed economies, the soft information in our analysis is less likely to be driven by distance, but rather through repeated lending.

3. DATA DESCRIPTION

3.1 Data sources

We obtain a large dataset from one of the big-four state-owned commercial banks in China, which consists of year-end information on all the outstanding loans made to 15 subcategories of five manufacturing industries from 2003 to 2006.[3] For each loan outstanding, our dataset contains information on its principal amount, maturity date, the province in which the loan was originated, interest rate, repayment status if the loan is due during the year, the borrowing firm's financial statements, ownership structure, and the industry where the firm operates.

Starting 2004, the bank implemented an internal credit rating system.[4] For any given year, the bank assigns a credit rating score to a borrowing firm at the time when it grants the firm's first loan of

[2] Our paper studies how information arising from long-term or repeated lending relationships affects defaults on outstanding loans. The impact of information on loan approvals or rejections, though an interesting issue, is beyond the scope of the paper. By focusing on the prediction of loan defaults instead of loan approvals, state-ownership as a proxy for lending relationship is not affected by whether loans are granted for political or policy considerations.

[3] Our bank maintains an industry classification system similar to the Industrial Classification for National Economic Activities from the Bureau of Statistics of China.

[4] Most banks in the United States have had internal credit ratings for at least since the 1980s. Note also that internal credit rating differs from credit scoring. Small business credit scoring (SBCS) in the United States was introduced in 1995 and applies to only micro business loans. By basically adapting consumer lending practices to micro business lending, credit scoring is mostly focused on using mercantile ratings and consumer credit bureau reports on the entrepreneur. It is best viewed as a subset of internally rated loans. In the case of SBCS, the entire loan underwriting process is limited to the score. Several studies have shown that the implementation of SBCS improves small business lending (Frame, Srinivasan, and Wooseley 2001 and Berer, Frame and Miller 2005). China introduces the

that year. The credit rating score ranks from 1 to 12, with 1 being the lowest (poorest credit quality) and 12 the highest (highest credit quality). Our dataset thus also contains all rating information between 2004 and 2006.

For each loan outstanding, its repayment status will be noted by the bank at the end of the following year in one of the following categories: repaid, unpaid, and written off. To ensure the conservativeness of our analysis, we define a loan in the stage of default if the principal is unpaid or written off by the due date. Since this definition is essentially restricted to whether the loan is repaid on time, it is narrower in the sense that other violations of loan covenants are not considered as default.

Our dataset contains 40,740 bank loans made between 2003 and 2006. There are 13 ownership categories for the borrowing firms in our sample, including state-owned, collectively-owned, state-controlled (in which the state has a controlling stake), collectively-controlled (in which a collectively-owned entity has a controlling stake), foreign-owned and joint ventures, privately-owned, proprietorship, and joint-stock companies. We remove 2,667 loans borrowed by collectively-owned and collectively-controlled firms due to their ambiguous nature,[5] as well as loans borrowed by firms with missing ownership information.

In what follows, we first provide a general description of loan characteristics for our overall sample. We then discuss our sample selection procedure for the regression analysis on internal credit ratings.

3.2 Loan characteristics for Chinese firms

For the descriptive analyses, we include all loans in our dataset that are originated during a given calendar year with a specific maturity date in a different calendar year. With only the end-of-year data

internal credit rating system to its banks following the economic reforms. However, there is still a lack of development of credit scoring for either small businesses or consumers.

[5] The ambiguous nature of collectively-owned firms and their unique ownership arrangements are discussed and analyzed in details in Chang and Wang (1994).

available, short-term loans made and repaid in the same calendar year are not included in the sample unless there is a default.

Table 1 reports the summary statistics for the two main loan characteristics – size and maturity – over our sample period. We observe that short-term loans constitute the major source of funding for Chinese firms. In fact, on average 95% of loans in our sample have a maturity of one year or less, accounting for 84.45% of the aggregate outstanding principals. By contrast, loans of medium or long-term maturity, as well as firms receiving such kind of loans, are dramatically rare. Loans with maturity exceeding one year account for only 15.54% of total outstanding principal.

Table 1 indicates that unlike micro loans commonly seen in small business lending practices, our sample loans are dominated by commercial loans, which are less studied in the literature. For example, a back-of-the-envelope calculation shows that the average principal of loans with one year maturity is RMB 47.069 million in 2005, approximately $5.85 million. For loans with maturity exceeding one year, the average loan size is even higher: RMB 168.993 million, or approximately $21.02 million.[6]

Table 1 also compares the loan characteristics between state-owned and non-state-owned firms. While the number of non-state-owned firms receiving bank financing far exceeds the number of state-owned firms, and the number of short-term loans (maturity of one year or less) originated to non-state-owned firms is higher, state-owned firms receive on average larger principal amount than non-state-owned firms. Starting 2004, the year when our bank introduced its internal credit rating system for individual firms, there is a steady increase in number of firms without state background securing short-term, medium-term, and long-term loans, and in number of loans as well as principal amount initiated for such kind of firms. On the other hand, there is a steady decrease in both number of firms being funded and number of loans and principal amount initiated for state-owned firms. Despite that state-owned firms overall borrow at a larger amount than non-state-owned firms, especially for loans of long-term maturity, the gap between the two diminishes. In 2006, both types borrow almost equal amount.

[6] Based on an average exchange rate between 2003 and 2006 of $1 = RMB 8.04.

3.3 Crediting rating and loan default rate

Table 2 reports the summary statistics for the bank's internal credit rating scores and the subsequent short-term loan default rates. Since the bank implemented an internal credit rating system in 2004, we restrict the analysis to the 2004-2006 period. Table 2 reveals that internal credit rating for firms borrowing short-term loans generally increases over this period. For example, the average rating for one-year loans increases from 7.9 in 2004 to 8.4 in 2006. Since short-term loans constitute the majority of loans outstanding, this indicates an overall improvement in loan quality during the sample period, probably due to a tougher and more skilled screening process by the bank for the borrowers.

When partitioning the sample into state-owned and non-state-owned sub-samples, it is the state-owned firms that attribute to this overall improvement in credit quality. At the time when the bank implemented the internal rating system, state-owned firms on average had significantly lower rating scores – therefore poorer credit quality – than non-state-owned firms for loans with a maturity of less than one year (7.377 for state-owned firms versus 7.921 for non-state-owned firms). Over time, however, loans initiated to state-owned firms are consistently rated higher than those for non-state-owned firms, especially over longer maturities. For example, the average internal rating score for loans with medium maturity (more than one year but less than five years) in 2006 is 1.44 higher for state-owned firms (10.026 for state-owned firms versus 8.587 for non-state-owned firms). The difference is also statistically significant.

Table 2 reveals that consistent with the improvement in credit rating of short-term loans over our sample period, there is a decline in loan defaults for all sample firms. Prior to the implementation of the internal credit rating system, 14.71% of firms with loans of less than one year maturity and 16.97% of firms with one year loans originated in 2003 are in the stage of default by 2004. After the installment of the internal credit rating system there is a sharp decline in loan defaults despite that the number of short-term loans has increased. For example, 13.03% of firms with one year loans originated in 2004 – the year when the internal credit rating system is in place – are in the default stage by 2005, a 23% drop. Furthermore, only 4.37% of firms with one year loans originated in 2005 are in default in 2006.

Interestingly, the decline is more dramatic for stated-owned firms: 25.7% loans of less than one year maturities are pass-due in 2004, whereas in 2006 only 3.1% of such loans are pass-due. In addition, while the default rate on loans originated in 2003 for state-owned firms on average is higher than for non-state-owned firms, the difference between the two groups of firms is no longer statistically significant for loans originated in 2005.

4. LOAN DEFAULT AND INTERNAL CREDIT RATING

We now evaluate the economic role of the bank's information, captured by its private credit rating score, in the context of predicting loan default. By restricting our attention to a sub-sample containing short-term loans, default status, internal rating scores, and firms' financial information, we attempt to identify firm-specific factors that can potentially affect the incentive to default. We then investigate whether credit rating scores have additional predictive power after controlling for firm-specific factors known to affect default propensity.

Next, we explore the information content of the bank's internal credit rating by examining whether these ratings take into account of firm's fundamentals, and whether there is any evidence that the bank possesses additional proprietary information in evaluating credit delinquency. By parsing the rating score into a "hard" information component and a "soft" information component, based on the predicted and unpredicted components of credit rating score with respect to firm's fundamentals, we examine whether the soft information component has any predictive power. Since a bank's soft information evolves from its lending relationship with the firm, we further investigate whether the role of soft information differs depending on the depth of lending relationship.

4.1 Sample selection

We begin by extracting a sub-sample of loan data based on the following filtering criteria. Since our loan sample ends in 2006 and some loans initiated in 2006 require payment information in 2007, we

restrict our regression analysis to the sample containing short-term loans with a maturity date no later than 2006.

We concentrate on short-term loans (maturity of one year or less). This is because to identify the default status for medium and long-term loans requires information extended beyond one year. To avoid over-estimating default rate, for loans with a maturity less than one year, we only include those initiated on and after July 1st of year 2004 or 2005 with a maturity exceeding six months, which allow us to identify their default status during the period of 2005-2006. This yields a sub-sample of 2,878 firm-year observations.

We remove 428 observations with missing internal rating scores, 167 observations with missing financial statement information, 220 observations due to missing sales growth rate. Our final sample contains 2,063 observations. The detailed variable descriptions are provided in Appendix I.

Table 3 summarizes the characteristics between firms that defaulted on their loans and those that did not. There is preliminary evidence that the bank's internal credit rating predicts loan default as the rating differs depending on whether or not the loans are in subsequent default stage. For example, among loans initiated in 2004, those that were in default in 2005 have an average internal credit score of 5.38 associated with the borrowers, compared to the average score of 8.30 for those that were not in default. Firms defaulting on their loans also have a significantly higher degree of leverage, poorer profitability (measured by return on assets, or ROA), lower asset turnover, and smaller cash reserves.

Interestingly, Panels B and C show that the above observed default characteristics are similar between state-owned firms and non-state-owned firms. This suggests that most of the firm-specific fundamental factors that affect loan default are relatively universal across Chinese firms.

Lastly, both the average annual book value of total assets and annual number of employees in Table 3 indicate that our sample is not dominated by small manufacturing firms, even for firms that have defaulted their loans. For example, firms that borrowed short-term loans in 2004 and then defaulted in 2005 averaged total assets of RMB 371 million, and number of employees of 1,160. For our sample firms over this two-year period, the mean and median number of employees per firm are 2,345 and 405,

respectively (not reported). Unlike small businesses analyzed by the majority of previous studies, our sample firms have a relatively large operating scale and asset base. Our study hence sheds light on the characteristics and economic impact of relationship lending associated with commercial loans and large industrial firms.

4.2 Can hard information and internal credit rating predict loan default?

We start with a correlation analysis to identify the relationship between firm-specific hard information – including fundamental factors derived from their financial statements – and the subsequent loan defaults. As indicated in Table 4, a higher loan default rate is correlated with smaller asset base, greater leverage, state firms, and poorer operating performance in terms of ROA, asset turnover, cash reserve, and sales growth. A higher loan default rate is also correlated with a lower internal credit rating.

We now explicitly explore this relationship with the following probit regression model:

$$\Pr(Default = 1) = \beta_0 + \beta_1 Size + \beta_2 Leverage + \beta_3 ROA + \beta_4 AssetTurnover + \beta_5 Cash + \beta_6 SalesGrowth + \beta_7 State + \beta_8 State \times Size + \beta_9 ListedFirm + \beta_{10} \log(GDP) + \gamma_{industry} + \lambda_{year} + \varepsilon$$

Our dependent variable is a dummy equal to one if a firm is in the stage of defaulting its loan, and zero otherwise. Our independent variables include lagged firm-specific factors that could affect the default propensity: size, leverage, return on assets, asset turnover, cash reserve, sales growth, a dummy variable equal to one if the firm is state-owned,[7] and a dummy variable equal to one if the firm is publicly traded. We include log(GDP) to control for potential clustering of bank branches and borrowing firms based on local economic conditions.[8] In addition, we control for both industry and year fixed-effects, $\gamma_{industry}$ and λ_{year}.

[7] In 2005, among the 1,066 firms in our sample we observe 12 firms changed their ownership from state-owned to non-state-owned. Excluding these 12 firms does not alter our findings.

[8] In the untabulated descriptive statistics, there is evidence that bank branches and ownership-based borrowers may cluster in certain areas based on local economic conditions. During the sample period of 2003-2006, 7.4% of firms in regions of high economic development are state-owned firms, while 40% of firms in regions of medium economic development and 37.6% in regions of low economic development are state-owned firms. Nevertheless, the fraction of state-owned firms decreases over time, regardless of the level of economic development. For example, the proportion of state-owned firms decreases from 13.2% in 2003 to 4.3% in 2006 in regions of high economic

Model 1 of Table 5 presents the probit regression results. For each variable we report both the coefficient estimate and the marginal effect. Robust standard errors are in parentheses. Model 1 indicates that hard information, captured by a firm's fundamentals, can significantly predict loan default. Specifically, firms with a larger asset base, lower leverage, higher profitability, faster asset turnover, larger cash reserves, and operating in the regions of more advanced economic development tend to have a lower propensity of default.

In addition, the dummy variable for state-owned firms is positive and significant, but the coefficient for the interaction term between the dummy and size is negatively significant. This suggests that while state-owned firms tend to have a higher probability of default, this probability declines if such firms have a large asset base.

To examine whether the bank's internal credit rating, implemented nation-wide for all the branches, has any additional predictive power for loan default, we next include the bank's internal credit rating score in the previous regression model.

Models 2 and 3 of Table 5 suggest that internal credit rating is significantly negatively related to the probability of default, regardless whether or not the proxies for firm-specific hard information are included. Specifically, one level increase in the internal credit rating (higher score) leads to a 1.8% lower probability of default (Model 3).

Interestingly, Model 3 reveals that once the internal credit rating is included, most of the proxies for firm-specific hard information – fundamental factors identified in Model 1 to help predict the probability of loan default, such as firm size, leverage, profitability, and asset turnovers – are no longer statistically significant. This suggests that internal credit rating scores subsume the effect of these factors.

We also observe from Model 3 that the coefficient associated with the dummy for state-owned firms is no longer significant after including the internal credit rating variable, and that the coefficient for

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development. The fraction decreases from 47.7% in 2003 to 32% in 2006, and from 42.7% in 2003 to 30.5% in 2006, in regions of medium and low economic development, respectively. In addition, loans initiated for firms from the regions of medium or low economic development do not necessarily rate lower than those of high economic development. In fact, loans initiated for the regions of medium economic development in 2006 on average have a higher quality than those of high economic development.

the interaction term between the dummy and the size variable becomes marginally significant. This is in contrast with the results of Model 1 where, in the absence of rating, both coefficients are significant at 5% level. This comparison provides preliminary evidence that internal credit rating is more informative about state-owned firms, with whom the bank tends to have a long-term relationship.

4.3 The information content of internal credit rating

The results from Table 5 show that the bank's internal credit rating scores are significantly related to the probability of default. Most of fundamental factors are no longer significant after including these rating scores, which suggests that internal credit rating scores incorporate the majority, if not all, of firm-specific hard information.

We next regress internal credit rating scores against these proxies for firm-specific hard information identified in Model 1 of Table 5. The OLS results from Panel A, Table 6 presents evidence that internal credit ratings do take into account firm-specific fundamental factors expected to affect loan default. Not surprisingly, larger asset base, lower leverage, greater profitability, faster asset turnover, higher level of cash reserve and sales growth lead to better credit quality and more favorable credit score. While state-owned firms on average are associated with low credit rating scores, this effect is more pronounced for firms of smaller size, as the coefficient associated with the interaction term is positive and significant.

Model 1 shows that these proxies for firm-specific hard information together explain approximately 42% of a firm's internal credit rating score. The rest two columns of Panel A, Table 6 indicate that there is a difference between state-owned and non-state-owned firms: For state-owned firms, firm-specific fundamentals are able to explain over 60% of the internal credit ratings, whereas they can explain only 36% for firms without state ownership. This suggests that financial information is more credible for firms that maintain a long-term banking relationship, and therefore is taken into account to a greater extent by the bank. In contrast, financial information from firms that do not maintain a long-term banking relationship is less influential when the bank sets its internal credit rating scores.

Panel B adopts a difference-in-difference analysis and examines whether a change in firm-specific hard information such as a firm's fundamental characteristics leads to a subsequent change in the internal credit rating. In the OLS regression, the dependent variable is the change in the internal credit rating. In the ordered probit regression, the dependent variable takes a value of 1 if a firm's internal credit rating improves from 2004 to 2005, or from 2005 to 2006, -1 if deteriorates, and 0 otherwise.

We observe that a change in asset base, leverage, and operating performance is significantly related to a subsequent change in internal credit rating. The ordered probit result suggests that an increase in asset base and operating performance measured by ROA and asset turnover leads to a higher internal credit rating, while an increase in leverage leads to a lower rating.

To summarize, our multivariate regression analysis and difference-in-difference analysis indicate that the bank's internal credit rating takes into account of firm-specific hard information such as firm's fundamental factors previously identified to predict loan default. In addition, these factors matter more if the firm has a long-term relationship with the bank.

5. THE ROLE OF SOFT INFORMATION

Our findings in Tables 5 and 6 suggest that being able to explain less than 42% of the internal credit rating, firm-specific hard information – captured by firms' fundamentals – is not sole determinant of the bank's internal credit rating. In addition, results from Table 5 indicate that most known fundamental factors are no longer statistically significantly predicting loan default once the international rating scores are included in the probit regression. This suggests that the bank possesses superior informational advantage when evaluating loan defaults.

5.1 Proxies for soft information and the depth of relationship lending

We follow an approach similar to Agarwal and Hauswald (2008) and parse the internal credit rating into a hard information component and a soft information component, which we define statistically based on the firm-specific fundamental information available during the period the rating score is

assigned. Specifically, we obtain the fitted values and residuals of the internal credit rating score from the overall sample result in Panel A, Table 6 (first column). In this case, *Bank Specialty*, measured by the residual component of the internal credit rating, captures the soft information arising from the bank's own assessment, monitoring, knowledge and experiences.

To identify whether or not this soft information is pertinent to relationship lending, we adopt three proxies for the depth of relationship. Our first proxy is based on whether a firm is owned or controlled by the state. Since historically, the Chinese government mandates the banking relationship with state-owned firms, the bank has more interactions with state-owned firms than non-state-owned firms. More importantly, this relationship is forged exogenously, and therefore is not subject to the doubt-matching endogeneity problem commonly seen in the existing literature.

Tables 1 through 3 indicate that there is a significant difference in number of firms, loan size, assets and employees between state-owned and non-state-owned sub-samples. To ensure the conservativeness of our analysis, for each sample year, we match a state-owned firm with a non-state-owned firm by industry and size.[9] We then compare the role of the bank's soft information over the two matched sub-samples.

Our second proxy is based on the frequency of borrowing over our sample period. For each firm, we compute the total number of loans outstanding with the bank over this period. We then classify a firm as an infrequent borrower if its number of loans falls below the sample median of 12. A firm is a frequent borrower if its number of loans outstanding is above 12.

Our last proxy is based on the duration of the banking relationship. Since the bank assigns its internal credit rating score at the time when it grants the first loan to the firm in a given year, for each firm in a given year (2004 or 2005), we identify the month when it obtains its first loan. We then trace back the firm's loan information prior to this month. The duration variable is then calculated as the difference between the current month and the earliest recorded time among all the loans borrowed by the

[9] For a given year and a given industry, we start with the smallest state-owned firm and match in size with a non-state-owned firm within the same industry. We then move to the next smallest state-owned firm and locate its match. Match is conducted without replacement.

firm prior to the current month. Since we can check a firm's historical loan records based on information available during the four-year sample interval (between 2003 and 2006), we choose the cut-off point of two years (24 months). If a firm's duration of its banking relationship exceeds 24 months, then we classify it as having a long-term relationship with the bank. If, on the other hand, a firm's duration of relationship is less than 24 months, then we classify it as having a short-term banking relationship.[10]

If the bank's soft information about a firm arises from its sustained lending relationship with the firm, then we should observe that the economic role of soft information is more prominent in predicting default for state-owned-firms, as well as for firms that borrow more frequently or have a longer relationship with the bank.

5.2 Soft information, relationship lending, and loan default

To examine whether the bank's soft information matters in predicting loan defaults, we replace the internal credit rating variable with Bank Specialty, and re-run the regression of Model 3, Table 5. Table 7 reports the probit regression results for state-owned and non-state-owned firms, frequent and infrequent corporate borrowers, and for firms that have a short and long-term relationship with the bank, respectively.

Table 7 shows that the bank's soft information is significantly related to default propensity, regardless firm's ownership, borrowing frequency, and the length of banking relationship. The negative coefficient for Bank Specialty suggests that greater proprietary information leads to a lower probability of default.

Although the difference in the coefficient for Bank Specialty between state-owned and non-state-owned firms is not statistically significant, it is economically significant. While a 1% increase in bank's

[10] Since this proxy is measured against the short sample period, it tends to be noisier in capturing the interaction between the firm and the bank than the proxies based on firms' ownership and borrowing frequency. A firm might have secured loans from the bank prior to the beginning of our sample period and beyond the records that are traceable. It then had little borrowing activities since then. In this case it is possible that such firms are classified as being associated with a short-term banking relationship. However, this type of misclassification works against finding the difference between firms of short- and long-term banking relationships. In addition, our focus on short-term lending activities, instead of long-term loans, helps to mitigate this potential misclassification problem.

specialty is associated with a 2% lower probability of commercial loan default for state-owned firms. The same increase leads to only a 1.4% decline in propensity of default for non-state-owned firms, a 30% drop in terms of marginal effect.

In addition, for state-owned firms, almost all the proxies for hard information are no longer significant after including Bank Specialty. This suggests that the bank's soft information, arising from a long-term and repeated lending relationship, substitutes almost all the hard information, and is almost capable of predicting loan defaults alone.

In contrast, for the non-state-firms where such a profound lending relationship rarely exists, Bank Specialty is unable to prevail over all the hard information. Even for the non-state-owned firms of a similar size and operating in the same industry as the state-owned firms, nearly half of the firm-specific fundamental factors remain statistically significant even in the presence of Bank Specialty. This suggests that the lack of a long-term lending relationship leads to the soft information possessed by the bank less capable of evaluating loan defaults for these firms.

We observe the similar results from the rest of Table 7 when the other two proxies are used to capture the depth of the existing lending relationship. The bank's soft information prevails over hard information for firms that borrow frequently from the bank, and for firms that begin their relationship with the bank early.

Interestingly, Table 7 also shows that across all three proxies, ROA consistently remains insignificant for firms that have a sustained banking relationship, but become significant for firms lacking a profound banking relationship. The variable of Cash is also less significant among firms with profound banking relationship than those without. Relatively to other proxies for hard information, these two are more difficult to verify and can be easily manipulated by Chinese firms.[11] This result thus highlights the importance of bank's soft information in replacing the type of hard information that is subject to easy manipulation.

[11] From an accounting perspective, cash manipulations are relatively limited compared to the options to manipulate ROAs. Nevertheless, cash manipulations are widespread among Chinese firms, especially among those of median or small sizes.

5.3 The economic impact of bank specialty: The case of earnings management

While various proxies for firm-specific hard information capture different dimensions of a firm's characteristics, they are not equally precise and credible. Since ROA is one of the most easily manipulated financial factors, we now further explore to what extent soft information from repeated lending relationship displaces hard information in the context of earnings management.

In this respect, China as a research setting offers a unique advantage. Because of the under-development of its stock market and constrains on other external financing sources, most Chinese firms, regardless of their sizes and scopes of business operations, rely on bank financing. In particular, the majority of Chinese firms are not publicly traded. In contrast to the other motives to manipulate earnings among public firms, the primary purpose of earnings management of the private firms is to obtain or maintain bank financing capacity and to delay the consequences associated with loan defaults.

To explore the role of soft information in the presence of earnings management, we first remove public firms from our sample. Next, we define a firm with a high degree of earnings management if the absolute value of its discretionary accrual falls above the sample median accrual level. The firm-specific discretionary accrual is estimated according to the modified Jones model (Dechow, Sloan and Sweeney, 1995). The annual industry level of accruals used in this estimation comes from SINOFIN's Chinese Industrial Enterprises Database.[12] Due to missing values during accrual estimations, there is a reduction in our sample size.

We re-run the regression of Table 7 for both the high- and low-earnings management sub-samples. If the scope and sophistication of the bank's soft information are the driving force behind how soft information predicts loan default and subsumes hard information that is subject to easy manipulation, we should expect to observe a stronger economic effect of bank specialty for the high-earnings management sub-sample than for the low-earnings management sub-sample, and for firms with pronounced banking relationship than those without.

[12] http://www.sinofin.net/Eng/home/index.htm.

The probit regression results are reported in Table 8. For brevity, control variables of size, leverage, ROA, asset turnover, cash, sales growth, listed firm dummy, log(GDP), as well as industry and year fixed effects are included in the probit regression but not tabulated.

Table 8 reveals that the economic impact of soft information is more prominent in predicting default for the high-earnings management sub-sample. The marginal effect associated with bank specialty is uniformly higher for the high-earnings management sub-sample than for the low-earnings management sub-sample, regardless of the proxies used for the depth of lending relationship. For example, a 1% increase in bank specialty leads to a 1.2% reduction in loan default probability for state-owned firms in the low-earnings management sub-sample, but the decline is over five times greater – a 6.5% – among state-owned firms in the high-earnings management sub-sample.

In addition, the marginal effect associated with bank specialty is greater for firms of a pronounced banking relationship. For example, among firms that have a high degree of earnings management, a 1% increase in bank specialty leads to a 1.6% reduction in the probability of loan default for infrequent borrowers, but the decline widens to 2.5% for frequent borrowers.

The results in Table 8 hence suggest that the impact of soft information is more dominating in the presence of easily manipulated hard-information, and this is especially the case when a firm has a profound relationship with the bank.

6. ROBUSTNESS

Our results – that the bank's internal credit ratings significantly predict commercial loan default, and that soft information emerged through a sustained banking relationship displays the role of hard information, especially hard information subject to easy manipulation – are robust with the following variations in sample and key variables.

1. We repeat the analyses (as those in Tables 5-8) excluding firms whose assets fall below the sample median of RMB 109.07 million since firm-specific hard information tends to be more precise for large firms, and the impact of factors other than information about industry, size,

and financial statements – such as background of senior management – is less likely to drive our findings.

2. We repeat the analyses (as those in Tables 7 and 8) for the following alternative proxy specifications for the depth of banking relationship: Instead of dividing borrowing frequency and duration of banking relationship based on sample medians, we divide them based on sample terciles. Alternatively, we define the duration of banking relationship based on sample terciles. In another alternative specification, we define banking-relationship based on a firm's previous borrowing frequency. Namely, a firm is classified as a frequent borrower if for its loans originated in 2004 it has borrowed more than 12 times from the bank (the sample median) in 2003, or if for its loans originated in 2005 it has borrowed more than 5 times (the sample median) during the period of 2003-2004. Lastly, instead of matching by industry and size, we remove the restrictions on state-owned and non-state-owned firms.
3. We repeat the analyses (as those in Tables 5-6) at loan level instead of firm level.
4. We use book value of assets as a proxy for size. Alternatively, we use the number of employees per firm to measure size.
5. We use regional GDP growth instead of log(GDP) to capture macro-economic uncertainty.

7. CONCLUSION

In this paper we study the economic role of banks' soft information, which evolved from a sustained lending relationship with a firm, in the context of loan default. Using a proprietary database from one of the largest state-owned commercial banks in China, we first document that proxies for firm-specific hard information, such as financial ratios derived from firms' financial statements, are significantly related to the probability of subsequent loan default, and that the bank's internal credit rating scores play an important role in predicting default.

Further analysis reveals that while the internal credit rating does incorporate firm-specific hard information, it is the soft information component of these ratings that contributes to the improvement in

assessing credit quality. In addition, we find that to what extent soft information prevails over hard information depends on the depth of the lending relationship. When evaluating loan delinquency, a strong repeated lending relationship allows soft information to substitute, rather than complement, the role of hard information, especially the hard information that is subject to easy manipulations by Chinese firms.

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APPENDIX I. Variable Definitions

Variables	Definition	Measured as of Year
Default	A dummy variable that equals one if a firm defaults its short-term loans, and equals zero otherwise. Default occurs if the short-term loan is unpaid or written off at the end of the following year.	This variable is measured at one year after the year when the loan is originated.
Rating	Bank's internal credit rating score. The score is 12 for a firm with the highest credit rating, and 11 for the second highest credit rating, and so on. It is 1 for the lowest credit rating.	This variable is measured as of the year when the loan is originated.
Listed Firm	A dummy variable equal to one if a firm is publicly traded, and zero otherwise.	
Size	The natural log of book value of total assets at the end of year.	This variable is measured at one year before the year when the loan is originated.
Leverage	Financial leverage, calculated as total liabilities divided by total assets at the end of year.	
ROA	Return on assets, calculated as net income divided by total assets.	
Asset Turnover	Asset turnover ratio, calculated as total sales divided by total assets.	
Cash	Cash reserve ratio, calculated as the sum of cash and short-term investments divided by total assets at the end of year.	
Sales Growth	Sales growth is calculated as the difference in the natural log of sales between current year and previous year.	
Log(GDP)	The natural log of GDP per capita of the province where the loan is originated.	This variable is measured as of the year when the loan is originated.
State	A dummy variable equal to one if a firm is owned or controlled by the state, and zero otherwise.	

Table 1. Loan characteristics for Chinese firms

The sample period is 2003-2006. A firm is classified as stated-owned if it is owned or controlled by the government.

Loan maturity	Number of firms			Number of loans			Total principal amount (billion RMB)		
	Overall	State-owned	Non-state-owned	Overall	State-owned	Non-state-owned	Overall	State-owned	Non-state-owned
2003									
<1 year	1,860	494	1,366	9,793	4,665	5,128	57.32	35.13	22.19
1 year	806	333	473	3,029	1,692	1,337	32.69	25.03	7.66
>1 & <=5 years	263	91	172	768	367	401	15.11	10.57	4.55
>5 years	16	10	6	54	45	9	2.1	1.93	0.17
2004									
<1 year	1,512	287	1,225	4,967	1,471	3,496	45.61	26.25	19.36
1 year	744	225	519	2,783	1,128	1,655	30.6	19.52	11.08
>1 & <=5 years	117	56	61	333	208	125	9.84	8.06	1.78
>5 years	9	8	1	64	62	2	4.54	4.39	0.15
2005									
<1 year	1,685	213	1,472	5,156	1,165	3,991	43.37	22.05	21.32
1 year	619	167	452	2,149	847	1,302	29.14	18.73	10.41
>1 & <=5 years	90	35	55	311	164	147	13.68	11.1	2.57
>5 years	7	5	2	58	49	9	2.04	1.86	0.19
2006									
<1 year	1,968	175	1,793	5,822	981	4,841	48.7	24.46	24.24
1 year	839	155	684	2,394	867	1,527	33.15	21.21	11.94
>1 & <=5 years	142	38	104	371	142	229	10.23	5.54	4.69
>5 years	6	2	4	21	8	13	1.4	0.45	0.95

Table 2. Internal credit rating and default rate for Chinese firms

The sample period is 2003-2006. Internal credit rating starts in 2004. A crediting rating score ranks from 1 to 12, with 1 being the lowest credit quality and 12 the highest. Short-term loan default rate is based on the fraction of short-term (one year or less) loans that are not paid or are written off at the end of the subsequent year. Among loans mature in less than one year, only these with a maturity of more than six months and initiated on and after 1st July are included. A firm is classified as stated-owned if it is owned or controlled by the government. t-statistics testing the difference in mean internal credit rating between state-owned and non-state-owned firms are based on uneven variance. ***, **, and * indicate significance at 1%, 5% and 10% levels respectively.

	Internal credit rating							**Short-term loan default rate**						
	Overall		State-owned		Non-state-owned		t-statistics	Overall		State-owned		Non-state-owned		χ^2
	Obs.	Mean	Obs.	Mean	Obs.	Mean		Obs.	Mean	Obs.	Mean	Obs.	Mean	
	(1)	(2)	(3)	(4)	(5)	(6)	(4) - (6)	(7)	(8)	(9)	(10)	(11)	(12)	(10) - (12)
2003														
<1 year								1,164	14.71%	311	25.70%	853	10.70%	41.219***
1 year								806	16.97%	333	21.90%	473	13.50%	9.753***
>1 & <=5 years														
>5 years														
2004														
<1 year	1,045	7.775	281	7.377	764	7.921	-2.508**	1,059	7.77%	198	14.60%	861	6.20%	16.246***
1 year	659	7.900	221	7.891	438	7.904	-0.056	744	13.03%	225	14.70%	519	12.30%	0.755
>1 & <=5 years	95	9.547	52	9.750	43	9.302	1.114							
>5 years	7	10.429	7	10.429										
2005														
<1 year	1,641	7.932	209	7.981	1,432	7.925	0.268	1,129	1.90%	160	3.10%	969	1.70%	1.634
1 year	601	8.191	163	8.276	438	8.160	0.515	619	4.37%	167	2.40%	452	5.10%	2.12
>1 & <=5 years	73	9.397	31	10.323	42	8.714	3.531***							
>5 years	4	8.250	3	9.000	1	6.000								
2006														
<1 year	1,966	8.153	175	8.366	1,791	8.132	1.208							
1 year	839	8.400	155	8.755	684	8.319	2.158**							
>1 & <=5 years	142	8.972	38	10.026	104	8.587	4.591***							
>5 years	6	9.667	2	10.500	4	9.250	1.263							

Table 3. Descriptive statistics for sample firms

The sample period is 2003-2006. Dummy variable *Default* equals 1 if the short-term loan is not paid or is written off at the end of the subsequent year, and 0 otherwise. Internal credit rating ranks from 1 to 12, with 1 being the lowest credit quality and 12 the highest. Assets are of book value and are in 100 million RMB. Employees are the total number of employees per firm. Other variables are defined in Appendix I. t-statistics are based on uneven variance. ***, **, and * indicate significance at 1%, 5% and 10% levels respectively.

	2004			2005		
	Default = 0	Default = 1	t-statistics	Default = 0	Default = 1	t-statistics
Panel A: Overall sample						
Rating	8.30	5.38	11.009***	8.40	4.55	7.218***
Assets (in 100 million RMB)	12.40	3.71	4.927***	12.05	3.00	5.414***
Number of Employees	2,707	1,160	3.667***	2,252	789	4.274***
Leverage	0.51	0.56	-3.015***	0.48	0.55	-2.147**
ROA	0.07	0.03	8.563***	0.09	0.05	2.796***
Asset Turnover	1.00	0.80	3.885***	1.25	0.90	4.004***
Cash	0.07	0.05	5.149***	0.07	0.04	4.183***
Sales Growth	0.34	0.16	2.803***	0.33	0.23	1.233
Panel B: State-owned firms						
Rating	8.23	5.11	6.533***	8.32	4.38	3.220**
Assets (in 100 million RMB)	32.91	7.46	4.920***	44.33	2.12	6.870***
Number of Employees	7,720	2,467	3.939***	8,876	893	6.107***
Leverage	0.55	0.62	-2.621**	0.54	0.66	-1.779
ROA	0.04	0.02	3.599***	0.05	0.01	1.955*
Asset Turnover	0.79	0.71	1.175	0.83	0.68	1.639
Cash	0.09	0.06	2.556**	0.09	0.04	3.531***
Sales Growth	0.23	0.22	0.066	0.25	0.15	0.723
Panel C: Non-state-owned firms						
Rating	8.33	5.53	8.744***	8.41	4.60	6.346***
Assets (in 100 million RMB)	4.77	1.68	2.753***	4.25	3.24	0.762
Number of Employees	843	454	4.446***	653	761	-0.415
Leverage	0.49	0.52	-1.623	0.46	0.52	-1.568
ROA	0.09	0.04	7.317***	0.10	0.06	2.332**
Asset Turnover	1.08	0.86	3.316***	1.36	0.96	3.722***
Cash	0.07	0.04	5.235***	0.07	0.03	3.263***
Sales Growth	0.38	0.13	3.217***	0.35	0.25	1.013

Table 4. Correlation analysis

The sample period is 2003-2006. Dummy variable *Default* equals 1 if the short-term loan is not paid or is written off at the end of the subsequent year, and 0 otherwise. Internal credit rating ranks from 1 to 12, with 1 being the lowest credit quality and 12 the highest. Size is the log of book value of total assets. Other variables are defined in Appendix I. ***, **, and * indicate significance at 1%, 5% and 10% levels respectively.

	Default	Rating	Size	Leverage	ROA	Asset Turnover	Cash	Sales Growth	State
Rating	-0.365***								
Size	-0.057***	0.323***							
Leverage	0.114***	-0.247***	0.289***						
ROA	-0.178***	0.322***	-0.280***	-0.402***					
Asset Turnover	-0.114***	0.090***	-0.320***	-0.147***	0.495***				
Cash	-0.112***	0.183***	0.145***	0.084***	0.070***	0.107***			
Sales Growth	-0.069***	0.152***	0.019	-0.057***	0.180***	0.175***	0.063***		
State	0.059***	-0.044**	0.486***	0.208***	-0.297***	-0.230***	0.115***	-0.078***	
Log(GDP)	-0.187***	0.052**	-0.185***	-0.107***	0.207***	0.218***	0.005	0.047**	-0.306***

Table 5. Determinants of loan default

This table reports the probit regression results. The dependent variable is the dummy variable *Default* equal to 1 if the short-term loan is not paid or is written off at the end of the subsequent year, and 0 otherwise. Size is the log of book value of total assets. State is a dummy variable equal to 1 if the firm is state-owned and 0 otherwise. Size, ROA, Cash, and Sales Growth are measured as one year prior to the time the loan was originated and described in Appendix I. Industry classification is based on 5 manufacturing industries. For each regression model, we report both coefficient estimates and marginal effects. z-statistics based on robust standard errors are reported in the parentheses. ***, **, and * indicate significance at 1%, 5% and 10% levels respectively.

	Model 1	Model 2	Model 3
Rating		-0.226***/-0.019	-0.229***/-0.018
		(0.02)	(0.02)
Size	-0.137***/-0.013		0.046/0.003
	(0.04)		(0.04)
Leverage	0.696**/0.066		-0.448/-0.034
	(0.30)		(0.32)
ROA	-3.963***/-0.375		-0.091/-0.007
	(1.21)		(1.01)
Asset Turnover	-0.175*/-0.017		-0.065/-0.005
	(0.10)		(0.10)
Cash	-3.130***/-0.296		-2.074**/-0.159
	(0.86)		(0.86)
Sales Growth	-0.029/-0.003		0.017/0.001
	(0.08)		(0.07)
State	2.564**/0.592		1.802/0.317
	(1.09)		(1.16)
State × Size	-0.133**/-0.013		-0.101*/-0.008
	(0.06)		(0.06)
Listed Firm	0.032/0.003	-0.236/-0.016	-0.034/-0.003
	(0.27)	(0.28)	(0.31)
log(GDP)	-0.428***/-0.040	-0.460***/-0.038	-0.472***/-0.036
	(0.09)	(0.09)	(0.09)
Constant	5.666***	4.954***	4.658***
	(1.02)	(0.83)	(1.11)
Industry Fixed Effect	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
No. of observations	2,063	2,063	2,063
Wald χ^2	156.7***	279.8***	303.6***
McFadden's R^2	0.197	0.274	0.287

Table 6. Does internal credit rating incorporate firm-specific hard information?

The sample period is 2003-2006. In Panel A, the dependent variable is the internal credit rating, ranking from 1 to 12, with 1 being the lowest credit quality and 12 the highest. Size is the log of book value of total assets. State is a dummy variable equal to 1 if the firm is state-owned and 0 otherwise. Size, ROA, Cash, and Sales Growth are measured as one year prior to the time the loan was originated and are described in Appendix I. Industry classification is based on 5 manufacturing industries. In Panel B, the dependent variable in the ordered probit regression takes a value of 1 if a firm's internal credit rating improves from 2004 to 2005, or from 2005 to 2006, -1 if deteriorates, and 0 otherwise. Robust standard errors and are reported in the parentheses. ***, **, and * indicate significance at 1%, 5% and 10% levels respectively.

Panel A	Overall sample	State-owned	Non-state-owned
Size	0.805***	1.005***	0.783***
	(0.03)	(0.06)	(0.03)
Leverage	-3.815***	-5.238***	-3.352***
	(0.30)	(0.71)	(0.34)
ROA	9.651***	22.414***	7.930***
	(0.85)	(2.33)	(0.81)
Asset Turnover	0.258***	1.199***	0.169**
	(0.07)	(0.26)	(0.07)
Cash	3.946***	2.850**	4.003***
	(0.53)	(1.14)	(0.59)
Sales Growth	0.247***	0.128	0.261***
	(0.08)	(0.11)	(0.09)
State	-3.641***		
	(1.21)		
State × Size	0.142**		
	(0.06)		
Listed Firm	0.162	0.094	-0.441
	(0.21)	(0.24)	(0.50)
log(GDP)	-0.021	-0.103	0.028
	(0.10)	(0.18)	(0.11)
Constant	-5.839***	-9.914***	-5.947***
	(1.07)	(2.00)	(1.21)
Industry Fixed Effect	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
No. of observations	2,063	489	1,574
F	91.72***	66.89***	61.34***
R^2	0.42	0.62	0.37

Table 6 continued.

Panel B	OLS	Order Probit
ΔSize	0.515***	0.327***
	(0.15)	(0.12)
ΔLeverage	-1.986***	-1.589***
	(0.45)	(0.34)
ΔROA	5.955***	4.696***
	(0.95)	(0.65)
ΔAsset Turnover	0.181*	0.168**
	(0.10)	(0.08)
ΔCash	-0.411	0.110
	(0.60)	(0.45)
ΔSales Growth	0.040	0.040
	(0.06)	(0.04)
State	-0.103	-0.111
	(0.10)	(0.07)
Listed Firm	-0.003	0.003
	(0.18)	(0.12)
log(GDP)	0.069	0.038
	(0.08)	(0.06)
Constant	-1.108	
	(0.80)	
Industry Fixed Effect	Yes	Yes
Year Fixed Effect	Yes	Yes
No. of observations	1,549	1,549
F	10.08***	
R^2	0.11	
Wald χ^2		167.1***
Pesudo R^2		0.041

Table 7. Bank specialty, relationship lending and loan default

The sample period is 2003-2006. The dependent variable of the probit regression is the dummy variable *Default* equal to 1 if the short-term loan is not paid or is written off at the end of the subsequent year, and 0 otherwise. *Bank Specialty* is the residual from the OLS regression of the overall sample in Panel A of Table 6. A firm is *stated-owned* if it is owned or controlled by the state government. A firm is classified as a *frequent* (*infrequent*) borrower if it has borrowed from the bank at least (less than) 12 times during the sample period, where 12 is the sample median. For a given firm in a given year, duration is computed as the difference between the month that the firm obtained its first loan in that year and the earliest recorded time of its previous loans prior to that month. A firm is classified as having a long- (short-) term relationship with the bank if the duration is at least (less than) 24 months. For each year, state-owned and non-state-owned firms are matched by industry and size. The match is conducted without replacement. Size, ROA, Cash, and Sales Growth are measured as one year prior to the time the loan was originated. Industry classification is based on 5 manufacturing industries. For each regression model, we report both coefficient estimates and marginal effects. Robust standard errors are reported in the parentheses. ***, **, and * indicate significance at 1%, 5% and 10% levels respectively.

Proxy for the depth of the relationship	Firm's ownership		Borrowing frequency		Duration of banking relationship	
	Non-state-owned	State-owned	Infrequent	Frequent	Short	Long
Bank Specialty	-0.206***/-0.014	-0.177***/-0.020	-0.215***/-0.015	-0.256***/-0.020	-0.217***/-0.014	-0.250***/-0.017
	(0.06)	(0.05)	(0.04)	(0.03)	(0.03)	(0.04)
Size	-0.224***/-0.015	-0.199***/-0.023	-0.182***/-0.012	-0.172***/-0.013	-0.155***/-0.010	-0.264***/-0.018
	(0.08)	(0.07)	(0.05)	(0.05)	(0.04)	(0.06)
Leverage	0.195/0.013	0.821/0.093	0.522/0.036	0.377/0.030	0.221/0.014	0.829/0.055
	(0.67)	(0.63)	(0.40)	(0.47)	(0.35)	(0.60)
ROA	-3.608*/-0.247	-3.952/-0.448	-2.877**/-0.196	-1.064/-0.084	-2.036**/-0.128	-3.066/-0.204
	(2.16)	(2.41)	(1.24)	(1.19)	(1.04)	(2.04)
Asset Turnover	-0.629**/-0.043	-0.036/-0.004	-0.115/-0.008	-0.038/-0.003	-0.068/-0.004	-0.263/-0.018
	(0.29)	(0.25)	(0.10)	(0.20)	(0.11)	(0.21)
Cash	-1.923/-0.132	-1.499/-0.170	-3.757***/-0.256	-2.105*/-0.165	-2.960***/-0.186	-3.275**/-0.218
	(2.04)	(1.36)	(1.18)	(1.21)	(0.94)	(1.67)
Sales Growth	-0.140/-0.010	0.138/0.016	0.049/0.003	-0.276/-0.022	-0.084/-0.005	0.154/0.010
	(0.10)	(0.12)	(0.10)	(0.17)	(0.07)	(0.14)
Listed Firm	-0.007/-0.000	-0.161/-0.017	-0.203/-0.011	-0.174/-0.012	-0.668*/-0.023	0.089/0.006
	(0.45)	(0.38)	(0.43)	(0.35)	(0.40)	(0.39)
log(GDP)	-0.826***/-0.057	-0.084/-0.009	-0.498***/-0.034	-0.503***/-0.040	-0.535***/-0.034	-0.252/-0.017
	(0.21)	(0.22)	(0.12)	(0.14)	(0.10)	(0.18)
Constant	11.430***	3.453	6.952***	6.980***	6.967***	6.204***
	(2.44)	(2.30)	(1.42)	(1.64)	(1.23)	(1.98)
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	409	409	1,065	998	1,367	696
Wald χ^2	63.73***	67.32***	166.7***	132.7***	203.1***	106.5***
Pseudo R^2	0.347	0.288	0.313	0.274	0.287	0.331

Table 8. Bank specialty and hard information subject to manipulation: The case of earnings management

The sample period is 2003-2006. The sample contains private firms only. We define a firm with high degree of earnings management if the absolute value of its discretionary accrual falls above the sample median accrual level. The firm-specific discretionary accrual is estimated according to the modified Jones model (Dechow, Sloan and Sweeney, 1995). The dependent variable in the probit regression is the dummy variable *Default* equal to 1 if the short-term loan is not paid or is written off at the end of the subsequent year, and 0 otherwise. *Bank Specialty* is the residual from the OLS regression of the overall sample in Panel A of Table 6. Firm's ownership, borrowing frequency and duration of banking relationship are defined as in Table 7. For each year, state-owned and non-state-owned firms are matched by industry and size. The match is conducted without replacement. The same set of control variables as those in Table 7 are included in the regression analyses but are not tabulated. Industry classification is based on 5 manufacturing industries. For each regression model, we report both coefficient estimates and marginal effects. Robust standard errors are reported in the parentheses. ***, **, and * indicate significance at 1%, 5% and 10% levels respectively.

Panel A: High level of earnings management

Proxy for the depth of relationship	Firm's ownership		Borrowing frequency		Duration of banking relationship	
	Non-state-owned	State-owned	Infrequent	Frequent	Short	Long
Bank Specialty	-0.215***/-0.023	-0.266***/-0.065	-0.190***/-0.016	-0.233***/-0.025	-0.181***/-0.029	-0.258***/-0.033
	(0.08)	(0.07)	(0.05)	(0.05)	(0.04)	(0.08)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry and Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	174	132	435	354	507	141

Panel B: Low level of earnings management

Proxy for the depth of relationship	Firm's ownership		Borrowing frequency		Duration of banking relationship	
	Non-state-owned	State-owned	Infrequent	Frequent	Short	Long
Bank Specialty	-0.084/-0.001	-0.136/-0.012	-0.166**/-0.009	-0.274***/-0.013	-0.177***/-0.006	-0.244***/-0.012
	(0.12)	(0.09)	(0.08)	(0.05)	(0.06)	(0.06)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry and Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	155	136	317	466	403	375